IDAHO

FISH & GAME DEPARTMENT

Joseph C. Greenley, Director

SNAKE RIVER FISHERIES INVESTIGATIONS

Job Performance Report

Project F-63-R-3

Job III-b (Part I). Survey of Fish Populations in the Snake River from (1) Brownlee Flowline to Proposed Guffey Dam Site (Near Murphy, Idaho); (2) Grandview, Idaho to C. J. Strike Dam

Period Covered: March 1, 1973 to February 28, 1974

by

Harry Gibson
Fishery Research Biologist

April, 1974

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State of Idaho

Project No. F-63-R-3

Job No. III-b (Part I)

Name: SNAKE RIVER FISHERIES INVESTIGATIONS

Title: Survey of Fish Populations in the Snake Ritter: (1) Brownlee Flow Line to Proposed Guffey Dam Site (Near Murphy, Idaho); (2) Grandview, Idaho to C. J. Strike Dam.

Period Covered: March 1, 1973 to April 1, 1974

ABSTRACT:

We used electrofishing equipment to assess fish species distribution and relative abundance in the Snake River from the Brownlee Reservoir flow line upstream to the proposed Guffey Dam site.

This free-flowing river section contains at least 16 fish species. Game fish total nine species of which principal species of catchable size are channel catfish, black crappie, smallmouth bass and largemouth bass. Catchable size game fish composed 10.2% of the total sample or 35.3% of the game fish sample. Nongame fish comprised 71.1% of our sample with carp and suckers occurring most commonly in our electrofishing catch.

Three game fish species were not captured at all sampling sites in the study area. These species (warmouth, pumpkinseed and flathead catfish) appeared infrequently in our samples.

Channel catfish stomach analysis indicate they consume a large variety of foods and nonfoods: insects, crustaceans, molluscs, algae, fish, mice, corn cobs, grain, and pebbles. Food type consumed is dependent on availability, fish size, and time of the year.

We did not sample the Grandview, Idaho to C. J. Strike Dam sections because of equipment failure and time shortage. We will survey the fish populations in this section in 1974.

Submitted by:

Harry Gibson
Fishery Research Biologist

RECOMMENDATIONS:

Place brush piles in sloughs, island coves, etc. (where they will not wash away at high flows) in order to provide more cover during low flows. We found game fish at most areas, predominately in brush type habitat. Cover appears to be a limiting factor at low flows.

Continue life history studies on channel catfish and begin more detailed study of smallmouth and largemouth bass, the most important game fish species in this section of the Snake River. This information is necessary for proper management of these populations.

Document fish species, numbers, and condition in polluted areas in this section of the Snake River for future comparisons when the area may become pollution free. Fishery data taken during the era of pollution and when the same area is free from pollution may illustrate the value of nonpolluted water.

OBJECTIVES:

To survey fish populations in the Snake River from: (1) Brownlee flow line to proposed Guffey Dam site (near Murphy, Idaho); (2) Grandview, Idaho to C. J. Strike Dam.

INTRODUCTION :

The overall objective of the Snake River fisheries investigation is to make a physical and biological survey of the Snake River upstream from the Brownlee Reservoir flow line (Cobb Rapids). This survey will provide data to fisheries managers for planning the assessment of the impact of proposed water projects. In addition, the data will provide a basis for evaluation of some future physical, chemical, and biological changes in the Snake River.

The Snake River Basin has been associated with fish kills, algal blooms, bacterial and pesticide contamination, thermal discharges, and radioactive wastes (E.P.A. 1973). Primarily an agricultural region, industrialization is expanding rapidly, with an accompanying growth of urban areas. This development has increased pollution in the Snake River from agricultural, industrial and municipal sources. Limited improvements have been made in Snake River water quality since quality standards were established or revised by Idaho on September 4, 1968 and Oregon on June 1, 1967 for the Snake River and its tributaries.

This report covers a fish population survey in a free-flowing Snake River section from the proposed Guffey Dam site (Walter's Ferry area) downstream to Cobb Rapids (Figure 1).

TECHNIQUES USED:

Sigler (1972) and Goodnight and Bowler (1973) reported good success in using electrofishing equipment for fish collections'in the Snake River. We used the same type of apparatus: a variable voltage pulsator (0-600 volts DC) powered by a 2,000-watt portable generator. This equipment was mounted in a 16-ft. aluminum jet boat (Figure 2). Our negative electrodes, two strips

of aluminum (11 ft. long, 6 in. wide), were insulated and fixed to the bottom of the boat. The bow capture net was the positive electrode.

We obtained our greatest fish capturing efficiency with pulsed direct current for 2 to 5 seconds, and automatically switching to continuous direct current until we broke the circuit. Fish in an electrical field of pulsed direct current exhibit stronger galvanonarcosis (inability of fish to swim due to narcosis), and those in continuous direct current show more galvanotaxis (tendency to swim toward the positive electrode). Fish were stunned and unable to escape the electrical field, and then attracted to the positive net.

We enumerated all captured fish by species, section and habitat type, and measured fish total length to the nearest centimeter. During our 4-month sampling period, some species of fish may add growth of 4-6 cm in length. I subdivided the sampling period into three shorter periods to better define growth changes during the season. Periods were 20-29 days in length.

All game fish species were weighed on a triple beam balance to obtain length-weight relationships. As length-weight relationships are a linear function, I expressed this data combined for the entire sampling period.

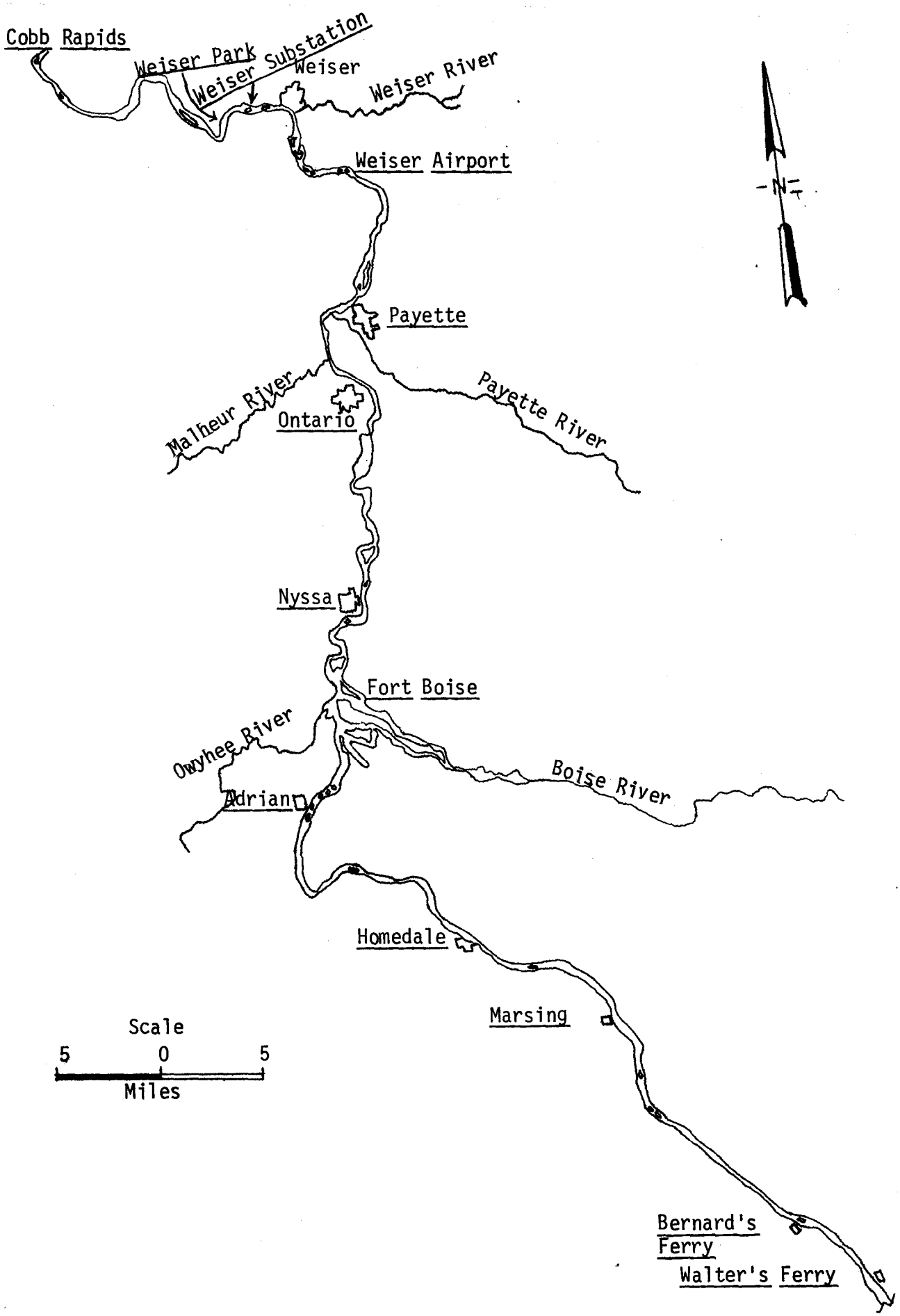
I assessed the age of centrarchids from scale samples and of channel catfish from the left pectoral spines which had been removed from captured fish. Scales from fish over 7 years old contained indistinct and crowded annuli (and checks) and I was unable to read them with certainty. We collected stomachs from a sample of channel catfish for food habit studies. Nongame fish greater than 30 an were enumerated but not taken aboard.

The fish condition factor indicates suitability of an environment or is used to compare fish between areas, or within the same area (between changes in time or environment). I calculated condition factors (K) for centrarchids and channel catfish from the following formula:

$$K = \frac{10^5, W}{{}_L 3}$$

W= weight in grams
L= total length in millimeters
Rounsefell and Everhart (1953) used standard length in this formula, but I used total length as most fish measurements taken by Idaho Fish and Game personnel are total length. As fish grow older they usually gain proportionately more in weight than in length so the value of K increases with age (Rounsefell and Everhart 1953). I assessed mean condition factors for fish age groups and time.

We collected fish population data from 13 areas (Figure 1) in the 100 miles of study stream. In each area we sampled both shorelines, upstream and downstream from the starting point, at 1-mile intervals (number depending on available time) totaling 82 sections, (100 to 500 yds in length). We electrofished from June 22, 1973 to'September 27, 1973.


Cobb Rapids
Weiser Park
Weiser Substation
Weiser
Weiser River
Weiser Airport
N
Payette
Malheur River
Ontario
Payette River
Nyssa
Fort Boise
Owyhee River
Boise River
Adrian
Homedale
Marsing
Scale
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Miles
Bernard's Ferry
Walter's Ferry

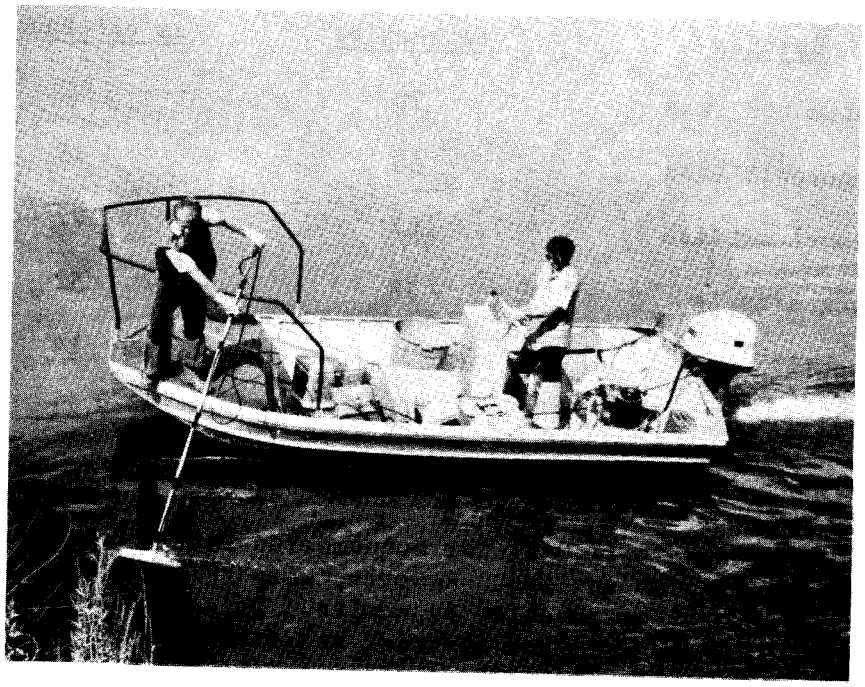


Figure 2. Electrofishing equipment mounted in 16-ft. jet boat.

FINDINGS:

Fish Species and Relative Abundance

We captured 4,245 fish in approximately 18,560 lineal yds. of electrofishing. Game fish comprised 28.9% of the sample (Figure 3) at a catch rate of 39 fish per hour. Nine of the 16 species captured were game fish (Table 1).

Our data substantiates Goodnight and Bowler's (1973) findings that game fish densities and species diversity in free-flowing sections of the Snake River are greater than in Swan Falls Reservoir, also on the Snake. Goodnight and Bowler collected only two game fish species (a total of eight species) in the reservoir in 1972 at a catch rate of 13.1 game fish per hour of electrofishing.

Length Data

Seven game fish species caught had individual fish of catchable size (15 cm or more) which totaled 35.3% of captured game fish (Table 2).

Table 2. Number of catchables (15 cm or more total length) and percent as catchable of seven game fish species captured by electrofishing in the Snake River (Cobb Rapids upstream to Guffey Dam site), 1973.

Species	No. of catchables	Percent as catchables
Smallmouth bass	70	12
Largemouth bass	60	75
Channel catfish	187	97
Black crappie	78	52
Bluegill	21	14
Whitefish	16	21
Flathead catfish	2	100

Carp (1,636) and suckers (1,048) far outnumbered smallmouth bass (566), the most prevalent game fish species. However, carp (Figure 4) and suckers (Figure 5) are largely represented by adults. This section of the Snake River appears to be an excellent spawning and rearing area for smallmouth bass as evidenced by juvenile numbers (Figure 6).

Small redside shiners (Figure 7) and chiselmouth (Figure 7) were present in large numbers in our sample and may constitute an'important prey supply for predator fish species. Large northern squawfish (Figure 7), a predator

Table 1. Catch per hour and per 100 yard section for the 16 fish species captured by electrofishing from the Brownlee Reservoir flow line to the proposed Guffey Dam site on the Snake River, 1973.

Species		Fish/hour electro-fishing	Fish/100 yds electro-fishing —
Carp	Cyprinus carpio	51.7	8.8
Bridgelip sucker	Catostomus columbianus		
Largescale sucker	Catostomus macrocheilus	*33.1	*5.6
Smallmouth bass	Micropterus dolomieui	18.5	3.2
Chiselmouth	Acrocheilus alutaceus	7.6	1.3
Channel catfish	Ictalurus punctatus	6.0	1.0
Bluegill	Lepomis macrochirus	4.8	0.8
Black crappie	Pomoxis nigromaculatus	4.8	0.8
Largemouth bass	Micropterus salmoides	2.5	0.4
Mountain whitefish	Prosopium williamsoni	2.4	0.4
Redside shiner	Richardsonius balteatus	1.6	0.3
Northern squawfish	Ptychocheilus oregonensis	1.1	0.2
Pumpkinseed	Lepomis gibbosus	0.2	0.03
Peamouth	Mylocheilus caurinus	0.1	0.02
Flathead catfish	Plyodictis olivaris	0.1	0.01
Warmouth	Lepomis gulosus	0.1	0.02

*Most suckers were not taken aboard and we did not enumerate the two species

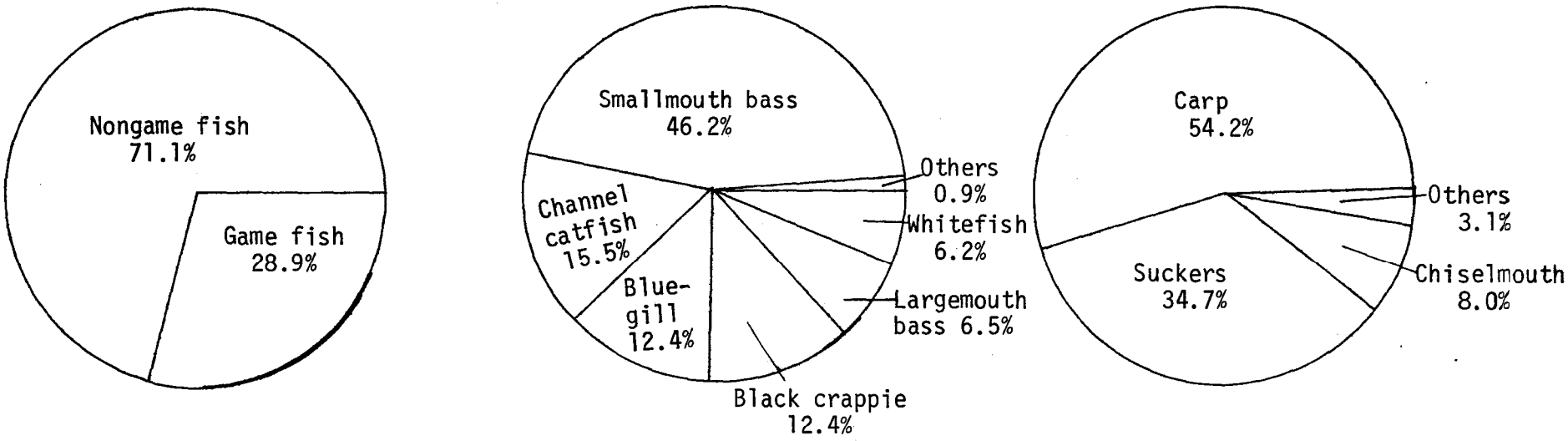
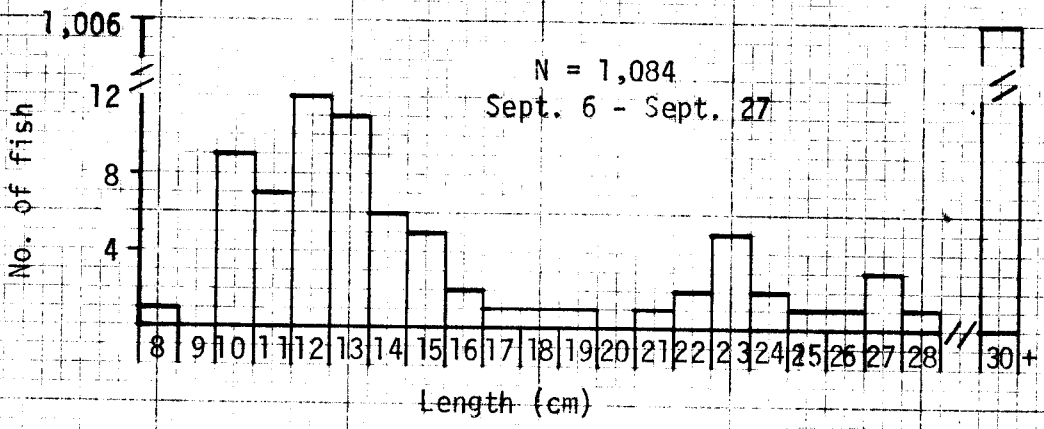
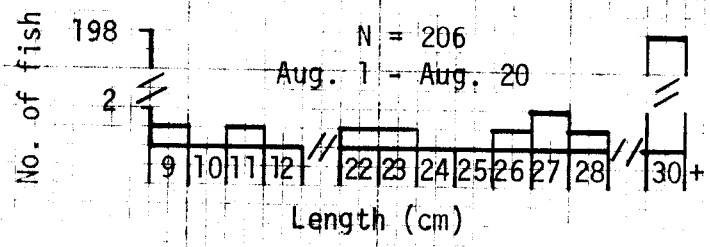


Figure 3. Percentage composition for total fish, game fish, and nongame fish in electrofishing sample, Snake River (Cobb Rapids upstream to Guffey Dam site), 1973.





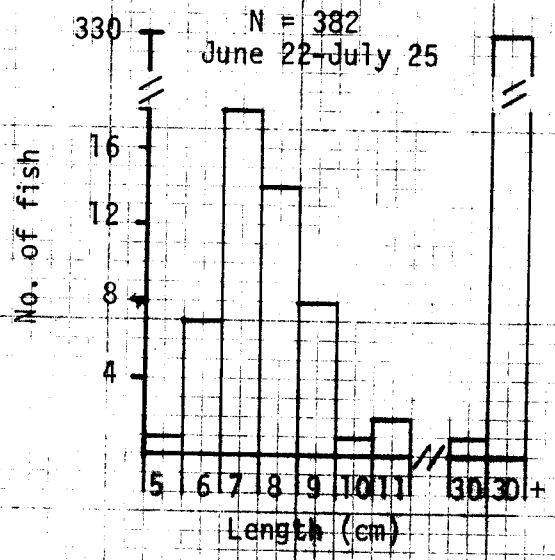


Figure 4. Length frequencies for carp in electrofishing sample from the Snake River (Cobb Rapids upstream to Guffey Dam site) during three time periods, 1973.

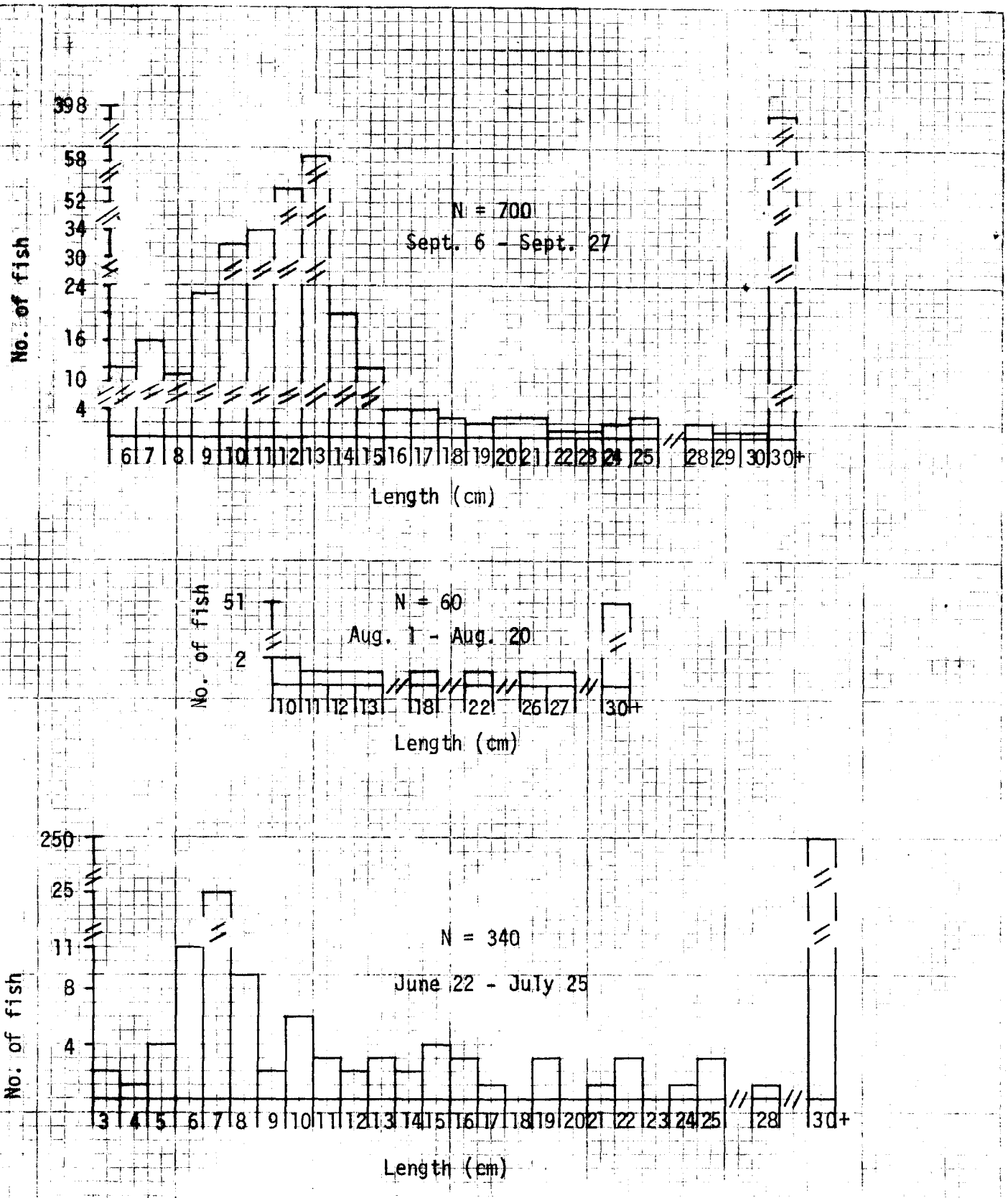


Figure 5. Length frequencies for suckers in electrofishing sample from the Snake River (Cobb Rapids upstream to Guffey Dam site) during three time periods, 1973. The two species were combined in the sample.

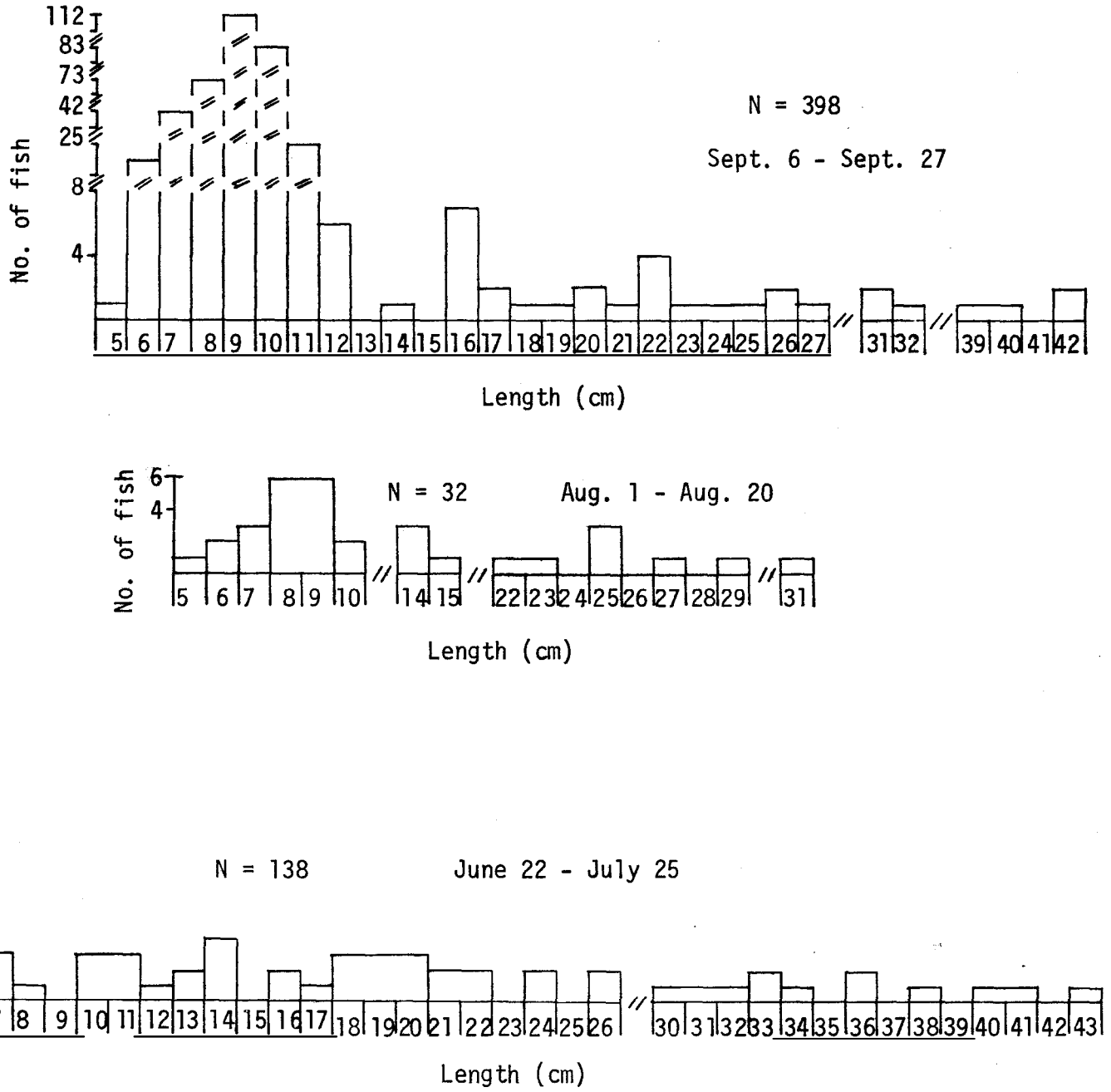


Figure 6. Length frequencies for smallmouth bass in electrofishing sample from the Snake River (Cobb Rapids upstream to Guffey Dam site) during three time periods, 1973.

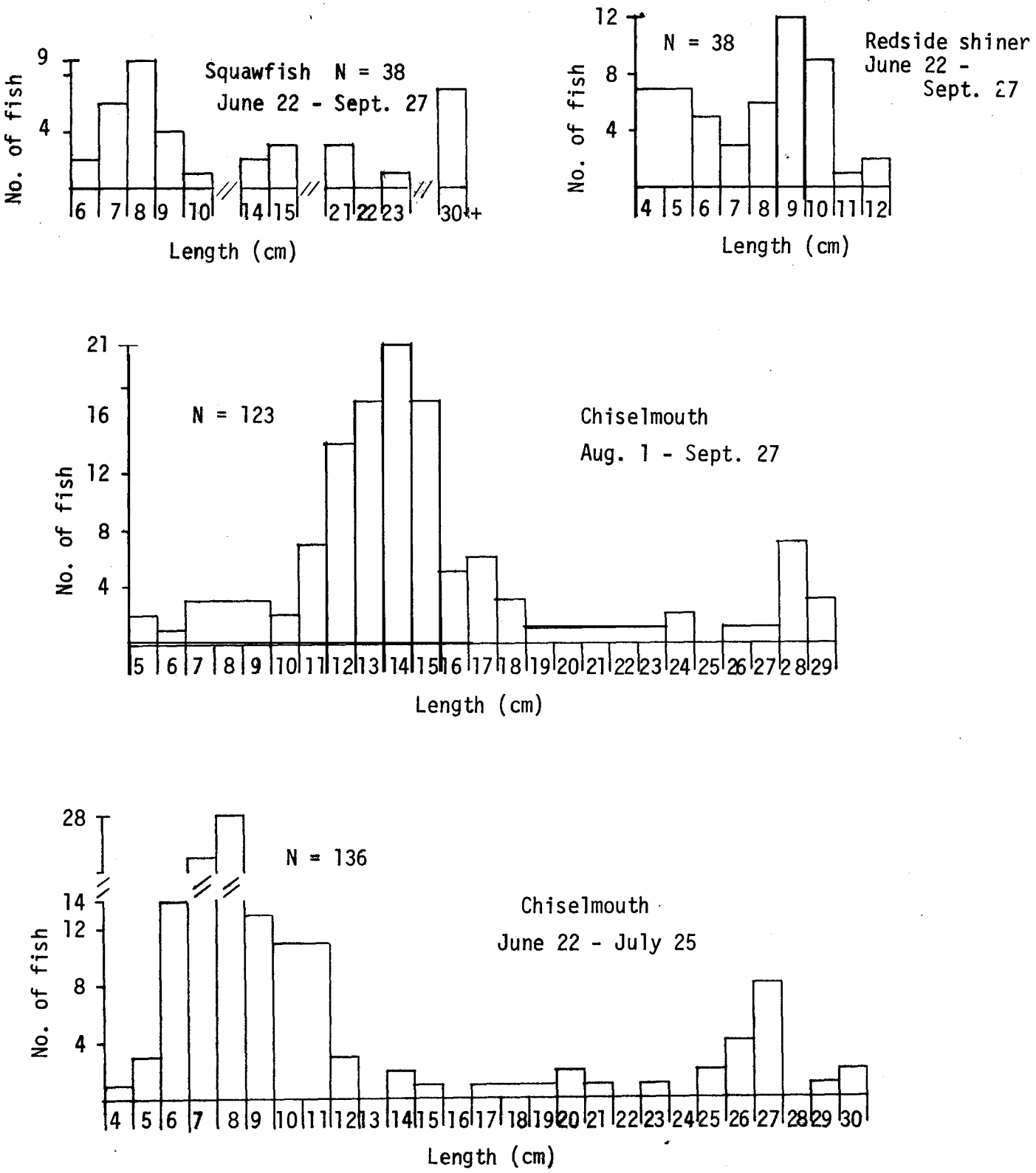


Figure 7. Length frequencies for squawfish and redside shiners (numbers combined during June - Sept.), and chiselmouth (during two time periods) in electrofishing sample from the Snake River (Cobb Rapids upstream to Guffey Dam site), 1973.

nongame species, comprised less than 17. of our total sample. Squawfish represented 32.0% of fish sampled in Swan Falls Reservoir and 13.7% in the Snake River section immediately below Swan Falls in 1972 (Goodnight and Bowler 1973). Smallmouth bass, largemouth bass (Figure 8) and black crappie (Figure 9), major piscivorous game fish species, comprised 47.9% of 15 cm or longer game fish species in our sample. Larger bluegill (Figure 8) and channel catfish (Figure 10) may also crop small fish. Whitefish (Figure 9) are predominately insectivorous.

Fish Condition and Age

I calculated condition factors for the 377 fish that I could definitely age. The K factor was then averaged for each species age group within a time period (Table 3). Ritchie (1973) reported the following condition factors he averaged from other researcher's work: smallmouth bass (total length 30 cm) 1.36, largemouth bass (30 cm) 1.5, channel catfish (30 cm) .98, black crappie (30 cm) 1.42 and bluegill (20 cm) 2.23. The K factors of smallmouth bass and largemouth $_{\text{bass}}$ in our sample are similar to those factors reported by Ritchie. Bluegill and crappie that we captured were in better condition, and channel catfish from our sample were in worse condition than Ritchies' corresponding averages.

Length-weight Relationships

Length-weight relationships (Figures 11, 12, 13, 14, and 15) are included in this report for future assessment of changes in the aquatic environment or in time in the study area. Length-weight relationships of smallmouth bass, channel catfish, black crappie and whitefish that we collected in 1973 are very similar to those plotted by Goodnight and Bowler (1973) in 1972 for the Swan Falls--proposed Guffey Dam site area (upstream from my study area on the Snake River). We captured fewer whitefish longer than 20 cm, but more smallmouth bass longer than 35 cm than did Goodnight and Bowler.

Species Distribution

All but three of the nine game fish species were captured in all electro-sampling areas from Walter's Ferry to Cobb Rapids. The only two flathead catfish were captured at Nyssa and Cobb Rapids. Warmouth were found in only three sample areas: (1) a slough near the Weiser airport, (2) downstream from Weiser and (3) near Fort Boise. We found pumpkinseed in the same slough and in brush piles in the main river channel near Bernard's Ferry and Fort Boise.

Our crew found smallmouth bass and channel catfish most often in areas of large rock as well as areas of deeply cut banks with rock-mud bottom and vegetative cover in the water (Figure 16). Largemouth bass were found predominately in mud-rock areas with some brush or tree overhang and vegetative water cover, but out of the main current. Sometimes several game fish species were captured from the same spot. It appeared that in areas of similar bottom and cover, the game fish preferred those areas which were shaded.

We captured the fewest game fish on shallow sloping beaches with mud or sand bottom and no cover (Figure 17). Nongame fish were usually found on these beaches, carp in the slower water and suckers in the faster current.

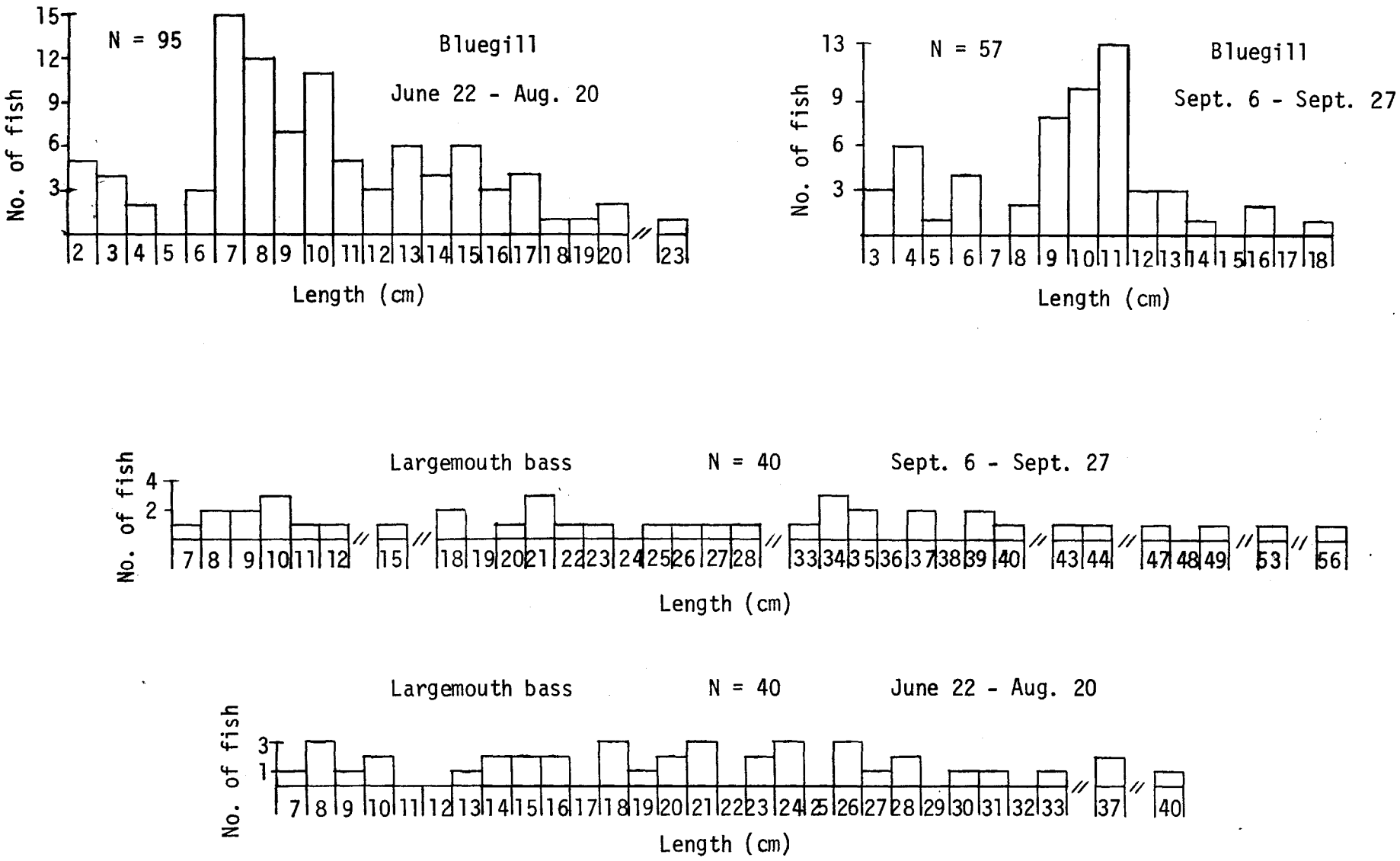


Figure 8. Length frequencies for largemouth bass and bluegill in electrofishing sample from the Snake River (Cobb Rapids upstream to Guffey Dam site), 1973. Few largemouth and bluegill were captured in June and July, and those numbers were totaled with those in the August period, 1973.

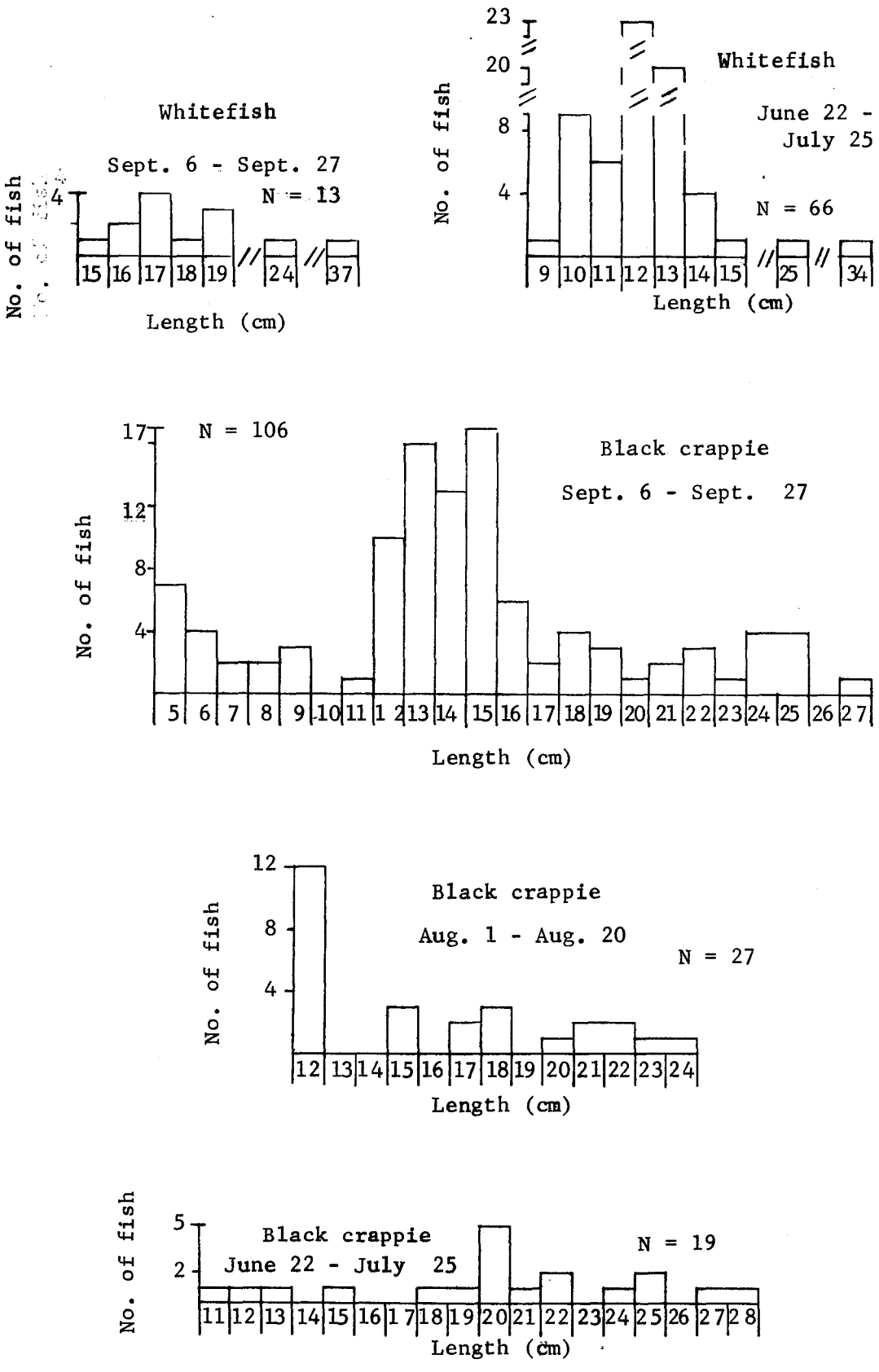
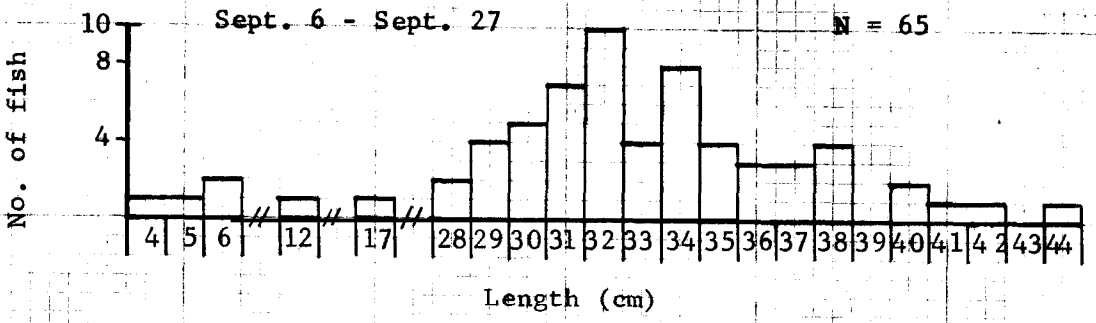
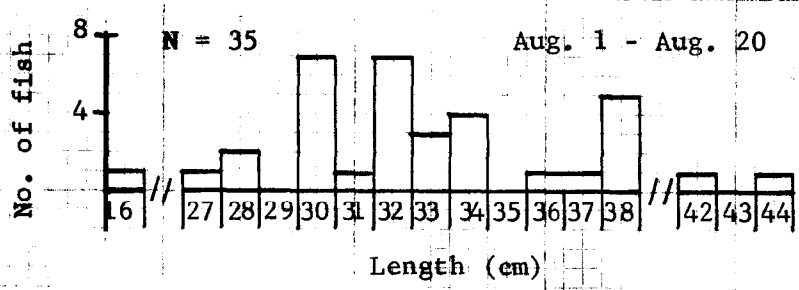


Figure 9. Length frequencies for black crappie (during three time periods) and Rocky Mountain whitefish (during two time periods) in electrofishing sample from the Snake River (Cobb Rapids upstream to Guffey Dam site), 1973. No whitefish were caught in the August period.





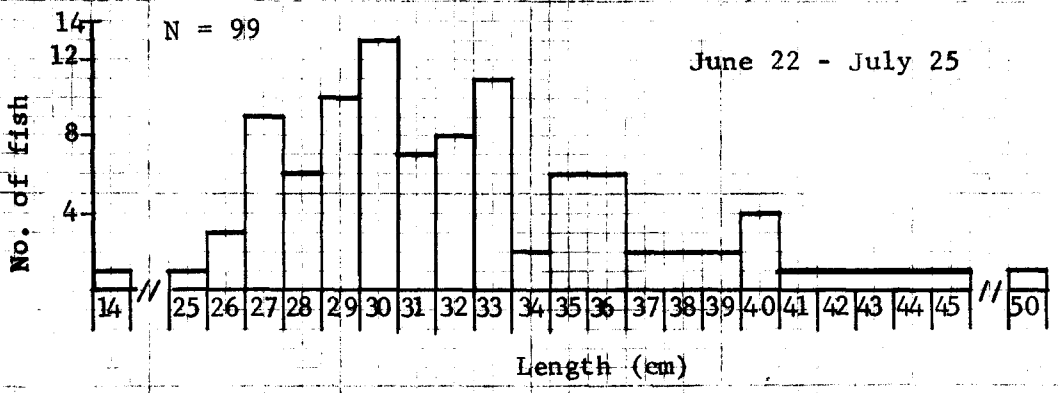


Figure 10. Length frequencies for channel catfish in electrofishing sample from the Snake River (Cobb Rapids upstream to Guffey Dam site) during three time periods, 1973.

Table 3. Mean condition factors for each age group of fish species captured in the Snake River (Cobb Rapids upstream to Guffey Dam site), 1973.

	Age Group							
	0+	1+	2+	3+	4+	5+	6+	7+
Smallmouth bass								
June - July								
Number of sample fish	11	10	13	7		2	3	
Fish size range (cm)	6-8	12-18	16-22	20-26		30-31	32-36	
Mean condition factor	1.57	1.52	1.55	1.86		1.30	1.36	
August								
Number of sample fish	9	1	1	4	3			
Fish size range	6-10	14	22	25	27-31			
Mean condition factor	1.58	1.31	1.23	1.59	1.25			
September								
Number of sample fish	29	9	7	5			3	
Fish size range	5-12	14-19	21-23	24-27			31-32	
Mean condition factor	1.50	1.38	1.49	1.49			1.48	
Largemouth bass*								
August								
Number of sample fish	1	4	7	6	3	2	1	
Fish size range	10	13-16	15-21	20-24	24-26	30-31	33	
Mean condition factor	1.40	1.48	1.48	1.80	1.75	1.55	1.67	
September								
Number of sample fish	3		5	4	3		2	1
Fish size range	8-10		18-22	21-26	27-28		33-34	30
Mean condition factor	1.17		1.54	1.53	1.63		1.45	1.66
Channel catfish								
June-July								
Number of sample fish					5	14	10	14
Fish size range					25-29	27-35	26-34	30-40
Mean condition factor					.88	.89	.95	.94
August								
Number of sample fish					2	16	6	2
Fish size range					27-30	28-38	32-37	38
Mean condition factor					.97	.86	.89	.82
September								
Number of sample fish				1	4	22	4	13
Fish size range				27	28-32	29-35	31-37	32-40
Mean condition factor				.84	.90	.93	.834	.86
Black crappie								
June-July								
Number of sample fish				2	4	2		
Fish size range				19-20	20-23	25-27		
Mean condition factor				2.16	2.08	1.98		

Table 3. (Cont'd) Mean condition factors for each age group of fish species captured in the Snake River (Cobb Rapids upstream to Guffey Dam site), 1973.

	0+	1+	2+	3+	4+	5+	6+	7+
Black crappie (cont'd)								
August								
Number of sample fish			6	6	3			
Fish size range			15-18	17-22	21-24			
Mean condition factor			1.50	1.42	2.01			
September								
Number of sample fish			16	3	9	3		
Fish size group			12-17	17-22	21-25	24-25		
Mean condition factor			1.68	1.81	1.80	1.69		
Bluegill*								
August								
Number of sample fish		18	10	9	1	2	2	
Fish size range		8-12	12-15	14-17	16	20-23	19-20	
Mean condition factor		2.20	2.60	2.25	3.20	2.52	2.65	
September								
Number of sample fish		5	2	1	1			
Fish size range		10-12	13-14	16	18			
Mean condition factor		2.38	2.52	2.93	2.58			

*No data for June - July.

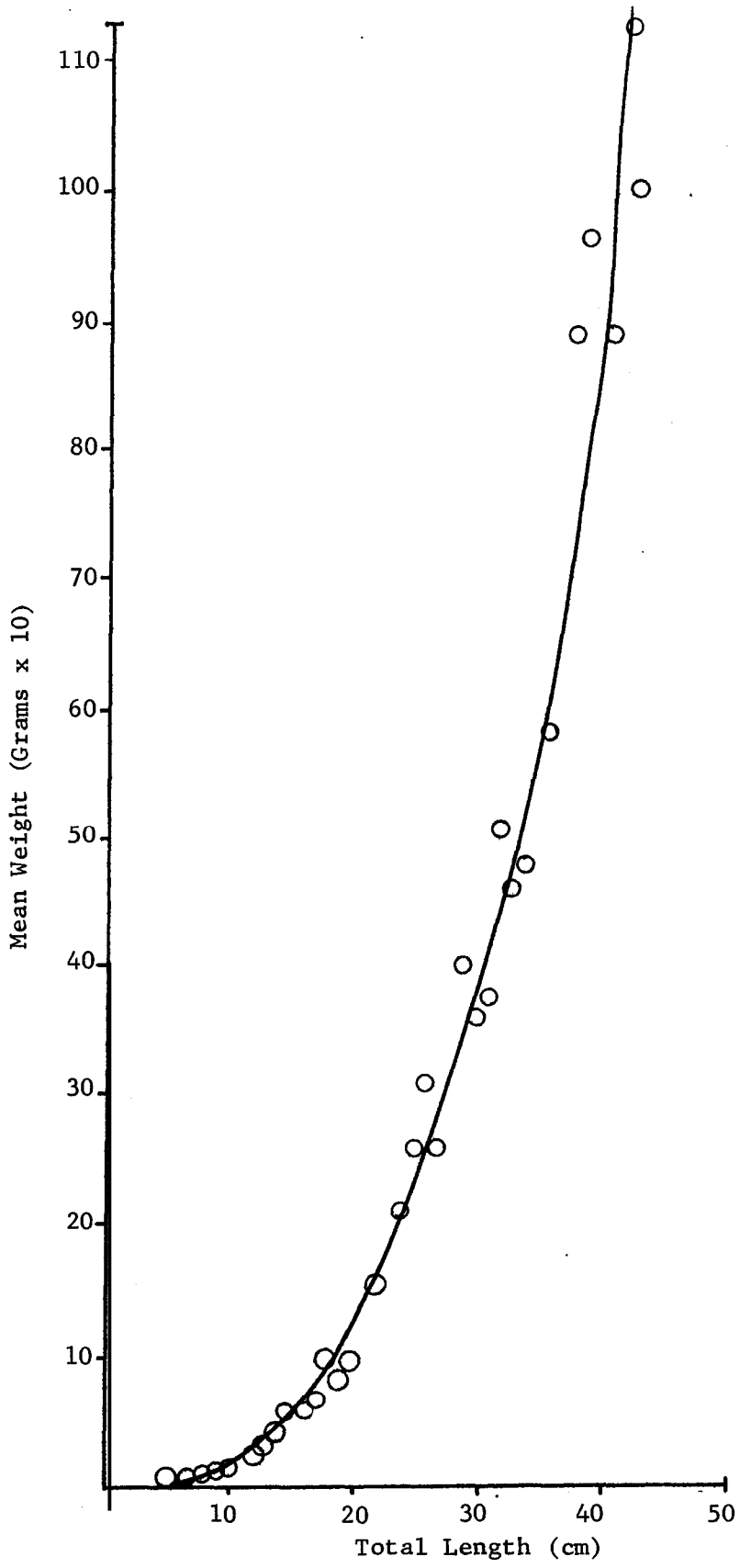


Figure 11. Length-weight relationship for smallmouth bass in electrofishing sample from the Snake River (Cobb Rapids upstream to Guffey Dam site), 1973.

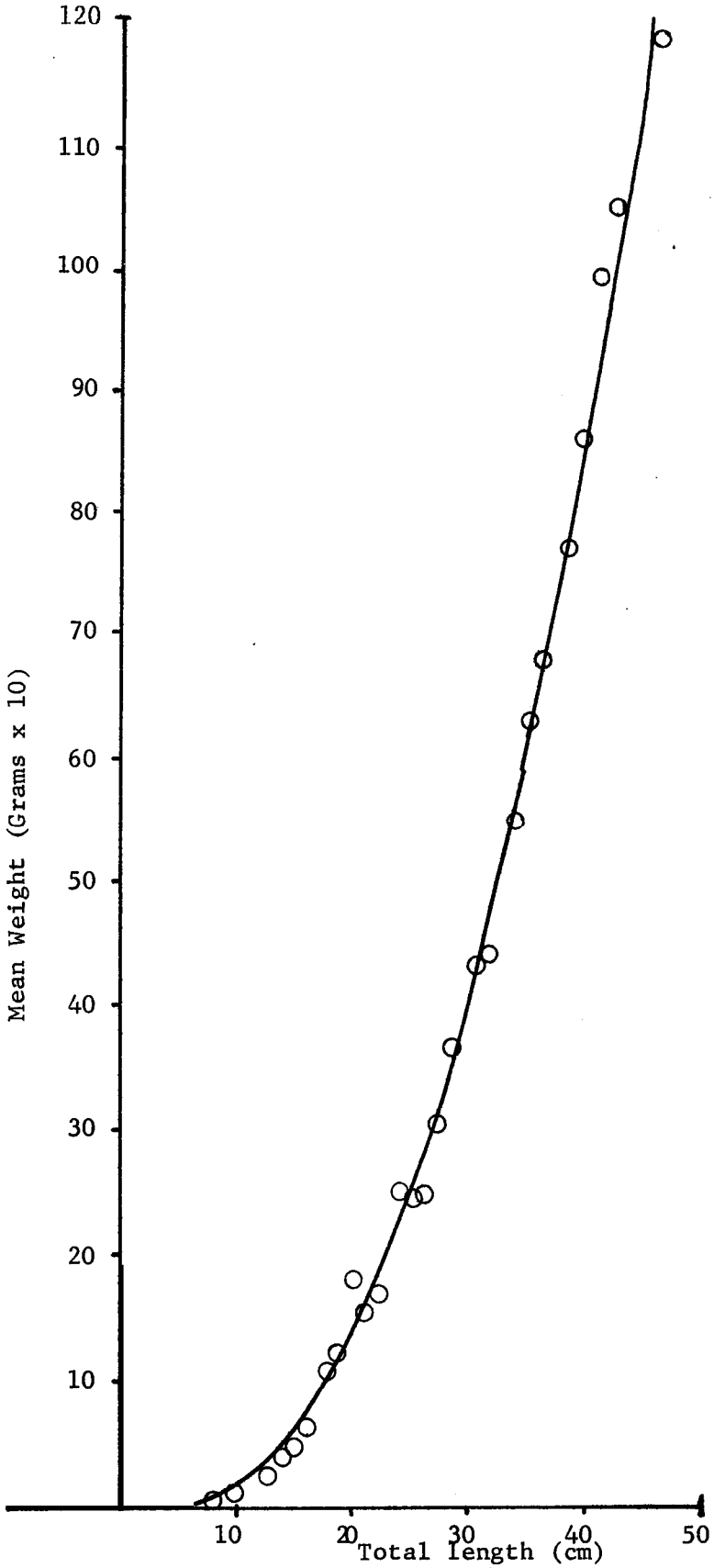


Figure 12. Length-weight relationship for largemouth bass in electrofishing sample from the Snake River (Cobb Rapids upstream to Guffey Dam site), 1973. Graph is continued on the next page.

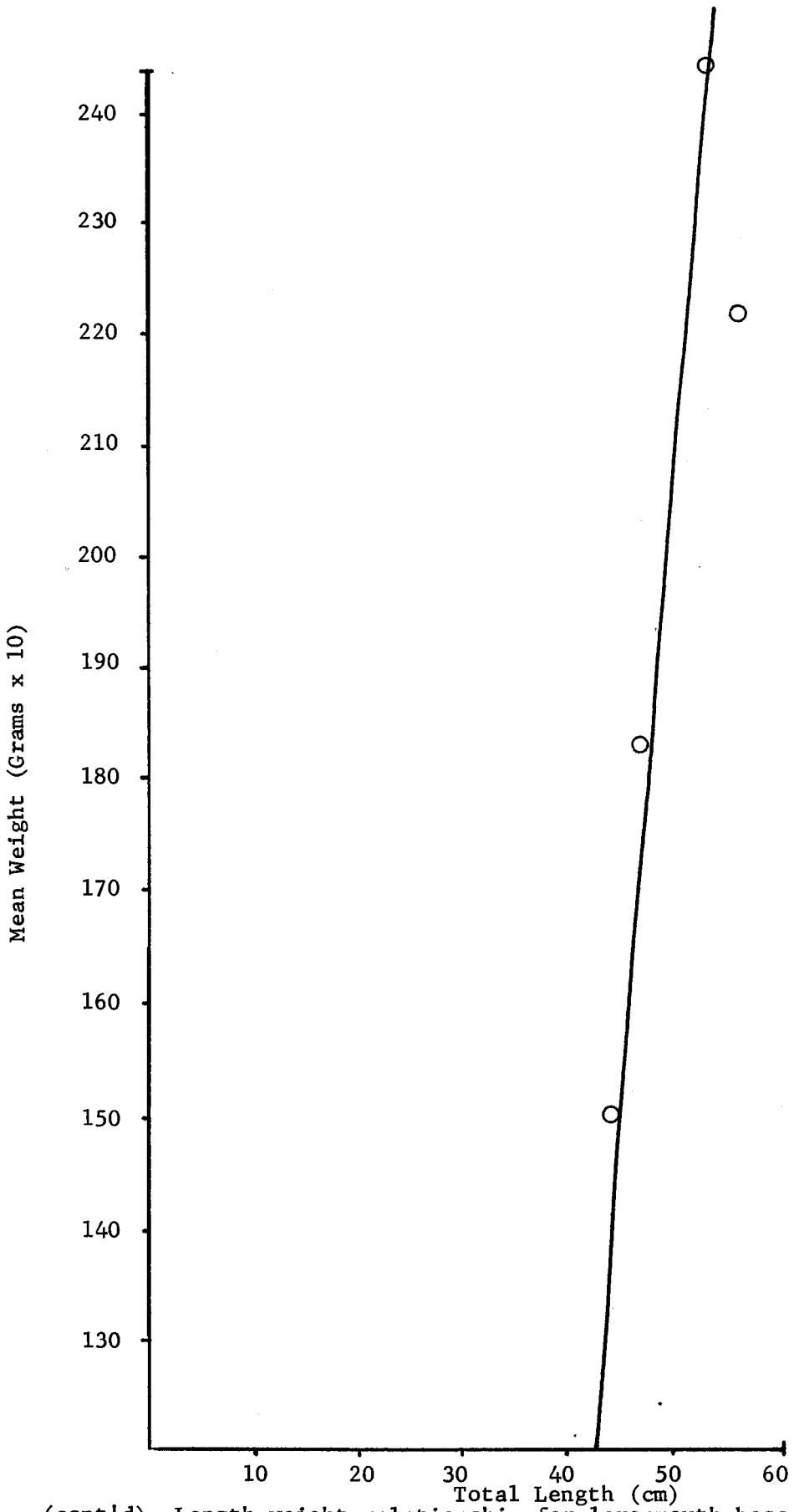


Figure 12. (cont'd) Length-weight relationship for largemouth bass in electrofishing sample from the Snake River (Cobb Rapids upstream to Guffey Dam site), 1973. Graph is a continuation from the preceeding page.

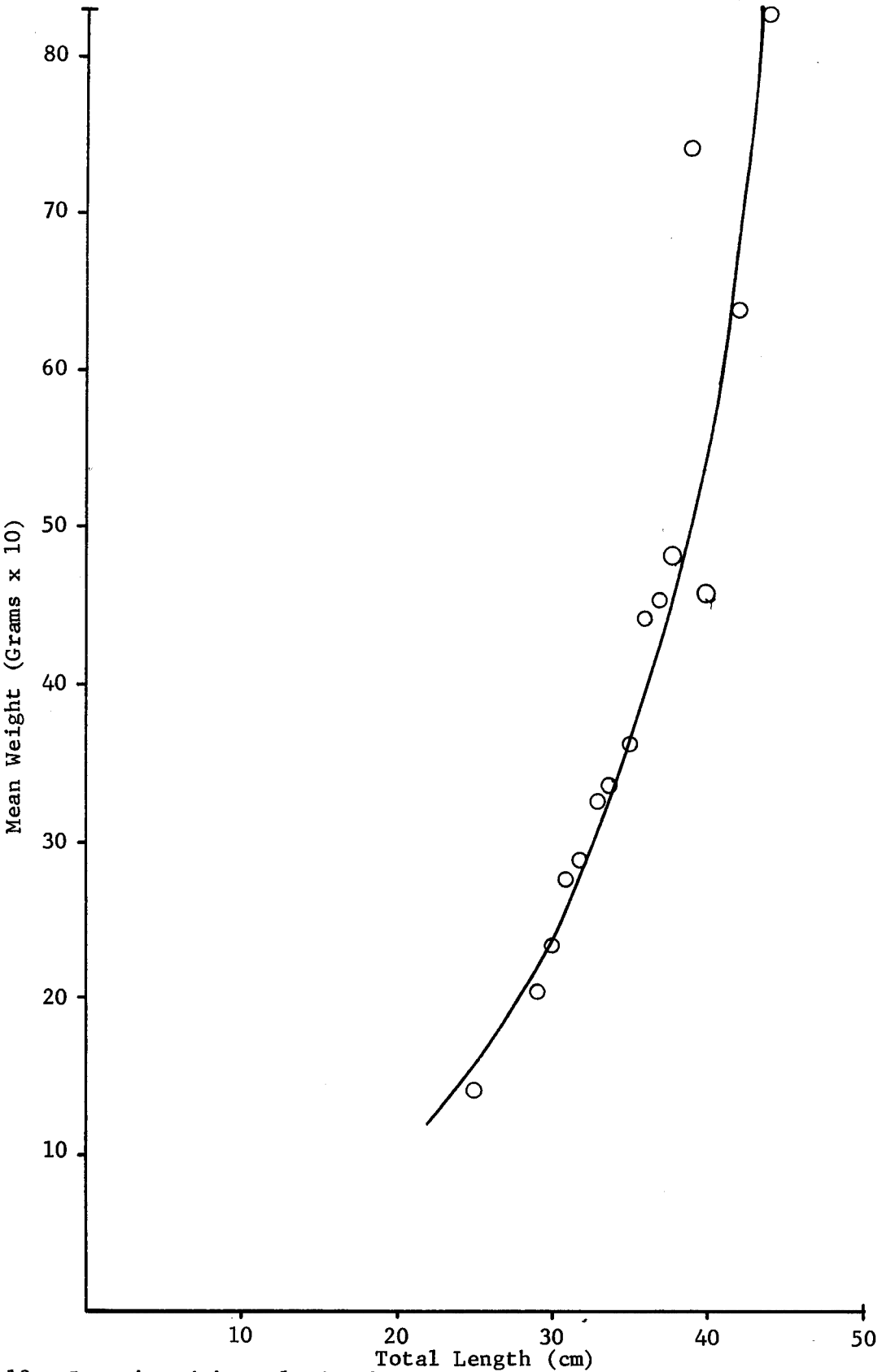


Figure 13. Length-weight relationship for channel catfish in electrofishing sample from the Snake River (Cobb Rapids upstream to Guffey Dam site), 1973.

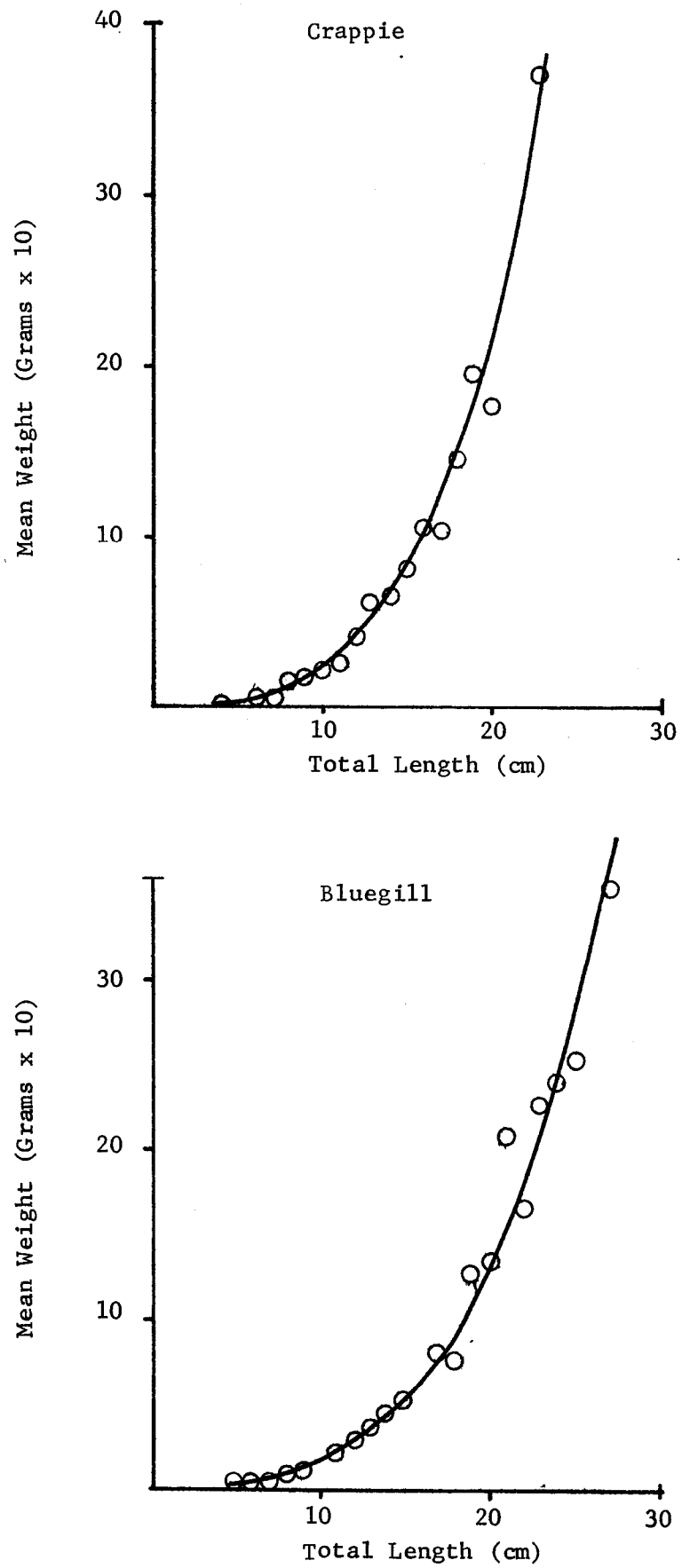


Figure 14. Length-weight relationship for crappie and bluegill in electrofishing sample from the Snake River (Cobb Rapids upstream to Guffey Dam site), 1973.

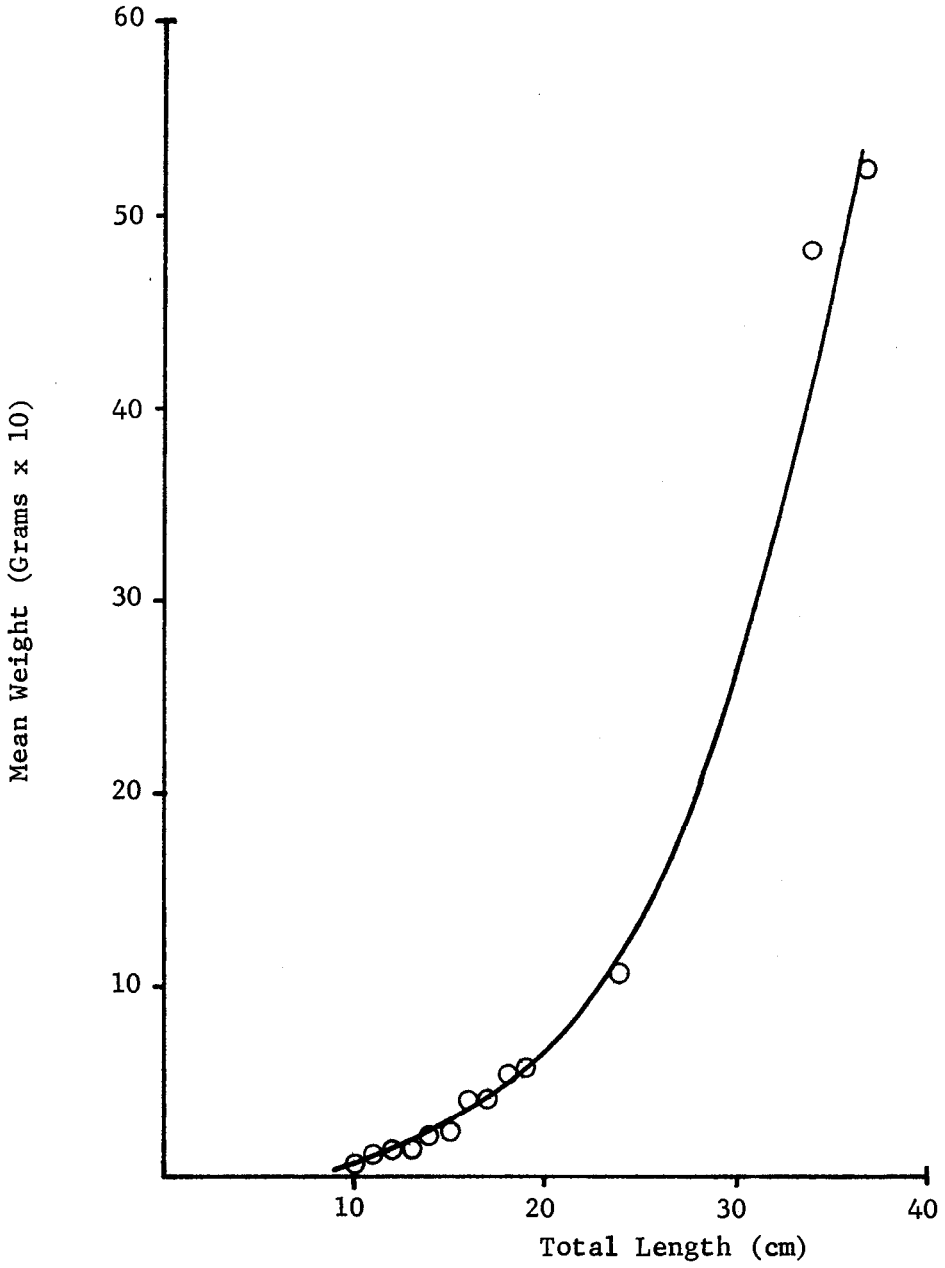


Figure 15. Length-weight relationship for whitefish in electrofishing sample from the Snake River (Cobb Rapids upstream to Guffey Dam site), 1973.

Figure 16. Habitat type water occupied by game fish species in the Snake River (Cobb Rapids upstream to Guffey Dam site), 1973.

Figure 17. Habitat type water usually occupied only by nongame fish species in the Snake River (Cobb Rapids upstream to Guffey Dam site), 1973.

On November 23, 1973, we electrofished a 300 yd section at Cobb Rapids that had been sampled previously on June 22, 1973. This shoreline section of large boulders, greater than 1 ft across the face, is a highway foundation. In June we captured 43 channel catfish 26 to 45 cm long and some of which were gravid and possibly spawning in this type substrate. In September, we saw three schools of channel catfish fry and captured 432 fish (about 1/3 of one school) that measured 4 to 7 an total length.

Reid (1973) found that channel catfish occurred more often than other species in the fisherman's catch in 1972 in my study area. Channel catfish were the most frequently captured catchable size game fish in our electrofishing sample in 1973 in the same area. Fishermen also caught yellow perch and bullhead catfish in small numbers in 1972, but we captured neither species by electrofishing in 1973.

Electrofishing is the best means of capturing a large sample of fish in their specific habitat without harm to the fish but it may show some species selectivity. Bottom dwelling species such as channel catfish and bullhead catfish are difficult to capture because when stunned they sometimes remain near the river bottom, are difficult to see and are often swept away by the current.

Food Habits of Channel Catfish

We collected 85 catfish stomaches (three empty) from channel catfish captured by electrofishing. I have observed less food discharge by fish captured by electrofishing than by hook and line.

Channel catfish are omnivorous and consumed a large variety of foods and nonfoods in the Snake River (Table 4). No stomachs more than half full contained less than three types of food items while some stomachs contained up to 10 types.

Mature and immature aquatic and mature terrestrial insects were the most important food items (Tables 5 and 6) and were taken by channel catfish throughout the study period in all study sections. Chironomid larvae, aphemeropteran nymphs, and trichopteran larvae were the major insects as numbers occurring in the stomachs.

Channel catfish from 10.1 to 30 cm preferred insects, but those from 20.1 to 30 cm began to diversify and add new food items to their diet (Tables 5 and 6). Bailey and Harrison (1948) found this insect preference in channel catfish from the Des Moines River, Iowa. As Snake River catfish grew over 30.1 cm, they consumed less insects by volume (although insects remained the major food item in percentage of occurrence), and began consuming other organisms such as rodents, fish, crayfish and algae.

Three channel catfish stomachs contained small fish. A 44 an catfish had a 5.6 cm channel catfish in its stomach. A stomach from a 40 cm catfish contained two redside shiners, 4.7 to 4.8-cm in length. The fish in the third stomach was unidentifiable. Three stomachs contained mammal or bird remains. I found a slightly digested mouse in a 34 cm catfish. The remaining two stomachs contained small bones and feathers.

Table 4. Foods and nonfoods in stomachs found channel catfish captured by electrofishing in the Snake River (Cobb Rapids upstream to Guffey Dam site), 1973.

1. Green algae
   Spirogyra sp.

2. Mollusca
   Gyraulus sp.
   Lymnaea sp.
   Physa sp.

3. Crustacea
   Isopoda
      Aquatic sow bugs
   Decapoda
      Fresh Water crayfish
   Amphipoda
      Gammarus sp.

4. Araneida
   Spiders

5. Homoptera
   Aphids

6. Hymenoptera
   Aquatic wasps
   Bees
   Ants
   Yellow-jackets

7. Odonta
   Family Anisoptera
      Dragonfly naiads

8. Hemiptera
   Water strider
   Water boatman
   Shorebug

9. Coleoptera
   Beetles

10. Emphemeroptera (Mayfly)
   Family bactidae
   Others unidentifiable

11. Trichoptera (caddisflies)
   Family Hydropsychidae

12. Lepidoptera (aquatic moths)
   Family Pyralidae

13. Diptera
   Family Tendipedidae (Chir-onomidae)
      Nonbiting midges
   Family Simulidae
      Blackflies
   Family Dolichopodidae
      Long legged flies
   Family Tabenidae
      Deer flies

14. Juvenile channel catfish

15. Redside shiners

16. Mouse

17. Bird

18. Rolled barley grain

19. Russian olive seeds

20. Red seed pods

21. Corn cob pieces

22. Twigs and leaves

23. Insect exuvia

24. Pebbles

Table 5. Percentage of volume of food organisms in stomachs from channel catfish, greater than 10 cm, collected from the Snake River (Cobb Rapids upstream to Guffey Dam site), 1973.

Fish length (all dates combined)	Number stomachs with food	Percent of total volume							
		Insects							
		Aquatic	Terrestrial*	Vegetation	Fish	Birds & mammals	Crayfish	Gammarus	Others
10.1 - 20 cm	3	86	14						
20.1 - 30 cm	18	63	30	1			1	1	4
30.1 - 40 cm	54	33	12	36	2	4	1	1	11
>40 cm	7	2	1	47	3	1	45		1
Time Period (all lengths grouped)									
June 22 - July 25	4	26	15	59					
Aug. 1 - Aug. 20	24	50	14	1	2		26	1	6
Sept. 6 - Sept.27	54	46	14	18	2	4	9	1	6

*Flying aquatic insects were classified as terrestrials

Table 6. Percentage occurrence of food organisms in stomachs from channel catfish, greater than 10 cm, collected from the Snake River (Cobb Rapids upstream to Guffey Dam site), 1973.

Fish length (all dates combined)	Number stomachs with food	Percentage occurrence							
		Insects							
		Aquatic	Terrestrial*	Vegetation	Fish	Birds & Mammals	Crayfish	Gammarus	Others
10.1 - 20 cm	3	100	66						
20.1 - 30 cm	18	94	55	11			6	17	39
30.1 - 40 cm	54	94	59	44	4	2	4	4	35
>40 cm	7	71	43	71	14	14	29	14	14
Time period (all lengths grouped)									
June 22 - July 25	4	75	50	50					
Aug. 1 - Aug. 20	24	83	58	25	8		12	17	42
Sept. 6 - Sept.27	54	98	57	43	2	4	4	4	32

*Flying aquatic insects were classified as terrestrials

I found gammarus In five channel catfish stomachs taken in the Weiser and Payette areas in August and September (Table 6). These catfish ranged from 21.7 to 37 an in total length. Aquatic sow bugs were present in two stomachs from channel catfish (33 and 40 cm) captured during September near Payette and Ontario. I found small molluscs and large crayfish in the stomach of catfish that ranged from 30 to 37 cm long. Seeds and pebbles, similar in appearance, were consumed by catfish 30 to 38 an in length.

Filamentous green algae, ranking second to insects in frequency of occurrence, was only found in catfish stomachs collected during September. Channel catfish caught in August on mud flats on the Chickahominy River in Virginia fed principally on filamentous green algae but changed their feeding habits during other seasons (Menzel 1945). Filamentous algae also dominated the diet of channel catfish averaging 28 cm in length at the Palo Verde Weir on the Colorado River (Kimsey, et al. 1957).

Two catfish (32 and 31 cm) captured at Gamble Island near Nyssa, Oregon had stomachs full of corn cob pieces and rolled barley grain, respectively. Gamble Island is a cattle feed lot island, and it appears channel catfish are eating cattle feed deposited directly in the water or through cattle feces.

Food Habits of Smallmouth Bass

We collected stomaches from five smallmouth bass that died during our shocking and measuring operations. All held large fatty deposits and were in good condition. Three stomachs were empty, and two from 25 and 32 cm bass contained bones and meat remains of unidentifiable fish. Fish ranked fourth in percentage of occurrence in smallmouth bass stomachs taken between Johnson Bar and Lewiston on the Snake River (Keating 1970).

Access Evaluation

I examined boat launch areas (Table 7) in the study area (Figure 18) at lower water flows this year than did Reid (1973) in 1972. Some boat ramp sites are unsuitable or difficult for launching a boat from a trailer at low flows. Other ramps need only a few improvements in general condition. Data on parking, sanitary facilities, road access and turnoff signs is listed by Reid (1973).

I feel boat ramp and access area distribution is good from Walter's Ferry to Cobb Rapids on the Snake River. There are many additional spots in this area where a bank fisherman can cross private land (with permission) to reach the river.

The river section from Nyssa to Ontario (16 miles) is the longest section without a public ramp. Procurement of land and access may be difficult as this area is all private land. This is a major goose nesting area and more water traffic here from easier access may be detrimental to goose productivity.

Table 7. Type of boat ramp construction and comments on ramp conditions at 17 access sites on the Snake River from Cobb Rapids upstream to Guffey Dam site, 1973.

Access Site*	Boat ramp construction	Comments
Walter's Ferry	Concrete	There is a steep dropoff on either side of the ramp.
1.	Concrete	This ramp needs general improvements and is difficult to use in swift current. There is a bad dropoff on the downstream side.
2 & 3	Concrete	Both ramps are unsuitable for use at low flows.
4.	Concrete	Ramp was constructed by Marsing Job Corp. It is usable but may be difficult with heavy boats at low flows.
5.	Concrete	There is a good angle for launching and docking in fast current and it needs only general clean off of mud.
6.	Dirt	This ramp has a deep drop-off and is now suitable only for light boats and trailers.
7.	Concrete	Ramp is in good condition.
10.	Concrete	Ramp is difficult to use when covered with mud and should be cleaned regularly.
11.	Gravel	With care, boats can be launched from this ramp at low flows. It usually needs yearly improvement because of annual bank erosion. This is an important fishery area and it may be wise to put a concrete ramp here.
12.	Concrete	Launching is a problem at low flows. The ramp needs improvements at its bottom end.
13.	Concrete	This is a wide ramp in excellent condition.
14.	Concrete	This is a good ramp.
15.	Concrete	This is a good ramp.
16.	Concrete	This is a poor ramp at high and very low flows and needs improvements.

Table 7. (cont'd) Type of boat ramp construction and comments on ramp conditions at 17 access sites on the Snake River from Cobb Rapids upstream to Guffey Dam site, 1973.

Access Site*	Boat ramp construction	Comments
17.	Concrete	General improvements needed at this ramp.
19.	Concrete	A good ramp but it is sometimes muddy getting to the ramp and in the parking area.

*Walter's Ferry was not covered by Reid (1972). Numbers are staggered and correspond to numbers by Reid. Refer to Figure 18 for location.

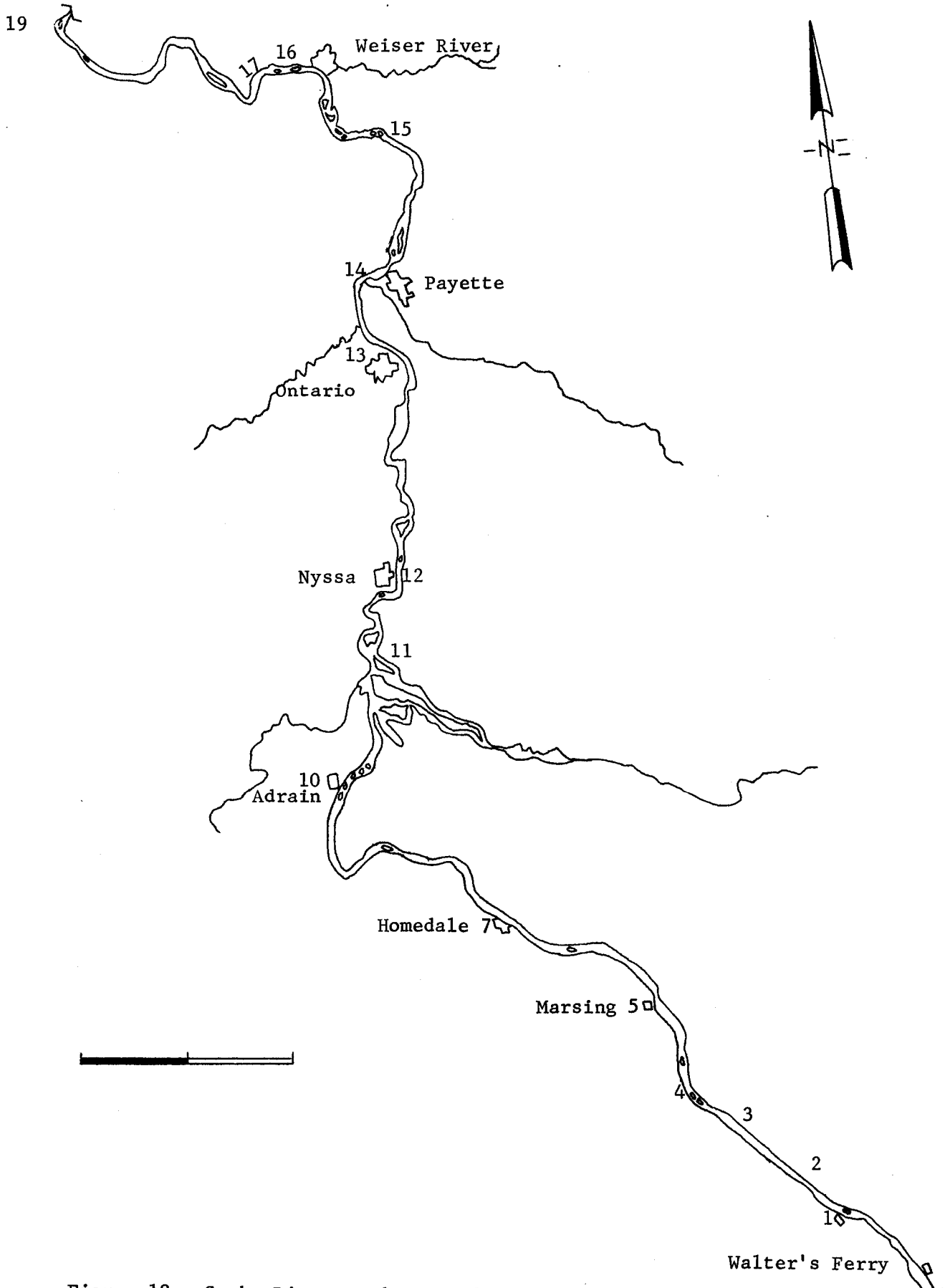


Figure 18. Snake River study area from Brownlee Reservoir flow line (Cobb Rapids) to the proposed Guffey Dam site (Walter's Ferry area) showing 17 boat ramps, 1973. Numbers are not in continuous sequence and correspond to numbers in Reid, 1973.

LITERATURE CITED:

Bailey, Reeve M., and Harrison, Harry M. Jr., 1948. Food habits of the southern channel catfish Ictalurus lacustris punctatus in the Des Moines River, Iowa. Trans. Amer. Fish. Soc., Vol. 75. 110-138pp.

Environmental Protection Agency, 1973. Water quality investigations of Snake River and principal tributaries--Walter's Ferry downstream from Weiser, Idaho. E.P.A. Report. National Field Investigations Center. Denver, Colorado. 42pp. and appendix.

Goodnight, William H., and Bowler, Bert, 1973. Survey of fish populations in the Snake River above Brownlee Reservoir. Project F-63-R-2, Job III-b. Idaho Fish and Game Department.

Keating, James F., 1970. Growth rates and food habits of smallmouth bass in the Snake, Clearwater and Salmon rivers, Idaho, 1956-67. Project F-1-03, Idaho Fish and Game Department.

Kimsey, J. B., Hagy, Robert H., and McCammon, George W., 1957. Progress report on the Mississippi threadfin shad, Dorosoma petenensisatchataylae, in the Colorado River for 1956. California Department of Fish and Game, Inland Fish. Admin. Report No. 57-23. 48pp. (Mimeo.)

Menzel. R. Winston, 1945. The catfish fishery of Virginia. Amer. Fish. Soc. Trans. Vol. 73. 364-372pp.

Reid, Will W., 1973. Survey of angler use and harvest in Snake River above Brownlee Reservoir. Project F-63-R-2, Job III-a. Idaho Fish and Game Department.

Ritchie, Clark A., 1972. Ritchie fish computer booklet. Oklahoma City, Oklahoma.

Rounsefell, George A., and Everhart, W. Harry., 1953. Fishery science its methods and applications. Published by John Wiley & Sons, Inc., New York. p. 322.

Sigler, William F., et al., 1972. The potential impact and assessment of mitigation of Swan Falls and Guffey Dam on the Snake River ecosystem. Prepared for Idaho Water Resource Board.

Submitted by:

Harry Gibson
Fishery Research Biologist

Approved by:

IDAHO FISH AND GAME DEPARTMENT

Joseph C. Greenley, Director

James C. Simpson, Chief
Fisheries Division

Jerry Mallet, Supervisor
Fisheries Research